JAPANESE [JP,2000-261499,A]

CLAIMS <u>DETAILED DESCRIPTION</u> <u>TECHNICAL FIELD</u> <u>EFFECT OF THE INVENTION</u> <u>MEANS</u>
<u>DESCRIPTION OF DRAWINGS</u> <u>DRAWINGS</u>

[Translation done.]

* NOTICES *

CLAIMS

[Claim(s)]
[Claim 1] It is the approach performed in the equipment which performs data transmission and
reception between external terminals, using either of two or more channels alternatively.
Between a part or all of two or more of said channels, and said equipment Make the proxy
equipment which executes processing about said data transmission and reception by proxy,
respectively intervene, and a logical mirror site is built. By performing a communication link local
between each proxy equipment and said equipment, and communicating the gestalt depending on
the channel connected to the proxy equipment concerned between each proxy equipment and
said external terminal The traffic dispersion approach characterized by distributing the traffic in
the equipment concerned.
[Claim 2] It is the approach performed in the equipment which transmits response data to the
addressing to an external terminal concerned through either of two or more channels when a
data Request to Send is received from an external terminal. Relate each of two or more of said
channels with the predetermined data characteristic, and the data characteristic of the response
data concerned is specified in the case of transmission of the response data to said external
terminal. The traffic dispersion approach characterized by distributing the traffic in said
equipment by leading said response data to the channel which suits this specified data
characteristic.
[Claim 3] the traffic dispersion approach according to claim 2 characterize by said predetermined
data characteristic be the information determine according to each engine performance or
quality of a channel including at least one of the size of the communications protocol use
between said external terminals , and said response data , the contents of data of a specific
location , and the priority **s of a response .
[Claim 4] The traffic dispersion approach according to claim 2 or 3 characterized by specifying
the data characteristic of said response data which should be transmitted based on the contents
of said data Request to Send which received.
[Claim 5] The traffic dispersion approach according to claim 2 or 3 which the proxy equipment
which executes processing about said data transmission and reception by proxy, respectively is
made to intervene between a part or all of two or more of said channels, and said equipment, and
is characterized by performing transmission of the response data to said external terminal
through said proxy equipment at least.
[Claim 6] In the communication system equipped with the communication device which performs
data transmission and reception between external terminals, using either of two or more
channels alternatively Between a part or all of two or more of said channels, and said
communication device, arrange the proxy equipment which executes processing about said data
transmission and reception by proxy, respectively, and a logical mirror site is built with each
proxy equipment and said communication device to it. Communication system which performs a
communication link local between each proxy equipment and said communication device, and is
characterized by constituting between each proxy equipment and said external terminal so that
the gestalt depending on the channel connected to the proxy equipment concerned may be
communicated.

[Claim 7] In the communication system which transmits response data to the addressing to an external terminal concerned through either of two or more channels when a data Request to Send is received from an external terminal Two or more interface devices for corresponding to each of two or more of said channels, and 1 to 1, and enabling the communication link between each channels, While holding the correlation information on a distinction means to distinguish the data characteristic of response data based on said data Request to Send, and each of two or more of said interface devices and a predetermined data characteristic Communication system characterized by forming the management tool which specifies the interface device corresponding to the data characteristic distinguished with said distinction means based on said correlation information, and leads said response data to said specified interface device.

[Claim 8] It is the communication system according to claim 7 characterized by said management tool specifying the interface device connected to the channel based on said distinguished communications protocol by said distinction means distinguishing the communications protocol used between said external terminals as said data characteristic.

[Claim 9] It is the communication system according to claim 7 with which it is characterized by said management tool specifying the interface device by which said distinguished size is connected to descending at a mass channel by said distinction means distinguishing the size of the size of said response data as said data characteristic.

[Claim 10] It is the communication system according to claim 7 characterized by said management tool specifying the interface device connected to the channel beforehand assigned for said every contents of the distinguished data by said distinction means distinguishing the contents of data of the specific location of said response data as said data characteristic.

[Claim 11] It is the communication system according to claim 7 characterized by said management tool specifying the interface device connected to a mass channel at order with said distinguished high priority by said distinction means distinguishing the priority of the response corresponding to said data Request to Send as said data characteristic.

[Translation done.]

DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] This invention relates to the technique which
controls concentration of the traffic in the server connected to the Internet.
[0002]
[Background of the Invention] It is common that service which performs information offer by
WWW (World Wide Web) of the Internet, FTP (File Transfer Protocol), etc. is offered through a
network service provider (it is called a "provider" for short Network Service Provider and the
following). Service which a provider offers is offered when a user mainly accesses at arbitration
the server which accumulates information. For this reason, if access from a user concentrates
on a provider's server, in the channel which that provider is preparing, delay of traffic may occur
or delay of traffic may occur in the channel between the servers and providers who are
accumulating information. When such delay occurs, enjoyment of smooth information becomes
impossible to a user.
[0003] Then, in order to cancel delay of traffic, it is performed that both users make two or more
servers distribute traffic by accumulating the same accessible information ("mirror information")
conventionally. Generally the location which offers mirror information is called the "mirror site."
The mirror site serves as two or more sites and a gestalt to which two sites 100 and 110 were
connected more simply at the Internet 10, as shown in drawing 6 . In the server 101 and the site
110, the server 111 is arranged by the site 100, respectively. Mirror information is accumulated
in each servers 101 and 111, respectively, and the interface devices 102 and 112 for controlling
connection between an internal network and channels 20 and 21 etc. are arranged further. By
preparing such a mirror site, it is lost that access from a user concentrates on one server, and
distribution of traffic is attained. However, if a mirror site is prepared, the cost which at least
two lines [at least two], i.e., a server, are needed, and construction of a system and a
maintenance take to the independent site (server) will become large.
[0004] The gestalt which distributes the traffic in the server concerned can be considered by
preparing the interface device which can connect either of two or more channels to one set of a
server alternatively as a solution means of such a problem, for example, a router. That is, as
shown in drawing 7 , the interface devices 211 and 212 for connecting self and the Internet 10 to
one set of the server 210 currently prepared for the site 200 through either of two channels 20
and 21 are arranged, and traffic is distributed.
[0005] However, traffic is not necessarily well distributed by channels 20 and 21 only by
arranging two or more interface devices 211 and 212 like illustration. In case a server 210
transmits data according to a demand of a user, this is because the suitable interface device
cannot be specified surely, in order not to memorize the information on the passed data, when
many of operating systems (Operating System) used for a server 210 receive the data
transmitted by the user.
[0006] That is, in a server equipped with a router, it is decided whether to transmit data using
which channel by the contents of record of the routing table with which a server is equipped. For
example, if it is data transmission to the communication device with which IP (internet protocol)

address which a server 210 manages was assigned, with reference to routing table, the channel connected to the communication device can be specified. However, when transmitting the data which answer a data Request to Send from the communication device with which the unspecified address, for example, a global address, was assigned, since the IP address of the communication device is unrecordable on routing table, a site 210 cannot specify the channel (that is, interface device) used in case the data which answer are transmitted. For this reason, traffic cannot be distributed well.

[0007] Then, this invention makes it a technical problem to offer the traffic control approach which enables distribution of traffic by simple technique. Other technical problems of this invention are to offer the cheap communication system equipped with the traffic dispersion function.

[0008]

[Means for Solving the Problem] The traffic control approach of the 1st invention which solves the above-mentioned technical problem It is the approach performed in the equipment which performs data transmission and reception between external terminals, using either of two or more channels alternatively. Between a part or all of two or more of said channels, and said equipment Make the proxy equipment which executes processing about said data transmission and reception by proxy, respectively intervene, and a logical mirror site is built. Between each proxy equipment and said equipment, it is characterized by distributing the traffic in the equipment concerned by performing a local communication link and communicating the gestalt depending on the channel connected to the proxy equipment concerned between each proxy equipment and said external terminal.

[0009] The traffic control approach of the 2nd invention is an approach performed in the equipment which transmits response data to the addressing to an external terminal concerned through either of two or more channels when a data Request to Send is received from an external terminal. Relate each of two or more of said channels with the predetermined data characteristic, and the data characteristic of the response data concerned is specified in the case of transmission of the response data to said external terminal. By leading said response data to the channel which suits this specified data characteristic, it is characterized by distributing the traffic in said equipment.

[0010] Here, a predetermined data characteristic is information determined according to each engine performance or quality of a channel including at least one of the size of the communications protocol used between for example, the aforementioned external terminals, and said response data, the contents of data of a specific location, and the priority **s of a response. This data characteristic may be specified from the header of response data etc., or you may make it specify it based on the contents of said data Request to Send which received. Moreover, the proxy equipment which executes processing about said data transmission and reception by proxy, respectively is made to intervene between a part or all of two or more of said channels, and said equipment, and it may be made to perform transmission of the response data to said external terminal through said proxy equipment at least.

[0011] The communication system of this invention which solves a technical problem besides the above In the communication system equipped with the communication device which performs data transmission and reception between external terminals, using either of two or more channels alternatively Arrange the proxy equipment which executes processing about said data transmission and reception by proxy, respectively between a part or all of two or more of said channels, and said communication device, and a logical mirror site is built with each proxy equipment and said communication device to it. Between each proxy equipment and said communication device, a local communication link is performed, and between each proxy equipment and said external terminal, it constitutes so that the gestalt depending on the channel connected to the proxy equipment concerned may be communicated. Said proxy equipment is changing the address of a data transmission place into the transmission place address of self while changing the address of for example, data transmitting origin into the transmitting agency address of self, and it forms the data transceiver gestalt between said external terminals and said communication devices virtually.

[0012] In the communication system which transmits response data to the addressing to an external terminal concerned through either of two or more channels when the communication system concerning other configurations of this invention receives a data Request to Send from an external terminal Two or more interface devices for corresponding to each of two or more of said channels, and 1 to 1, and enabling the communication link between each channels, While holding the correlation information on a distinction means to distinguish the data characteristic of response data based on said data Request to Send, and each of two or more of said interface devices and a predetermined data characteristic The interface device corresponding to the data characteristic distinguished with said distinction means is specified based on said correlation information, and it is characterized by forming the management tool which leads said response data to said specified interface device.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.

(The 1st operation gestalt) Drawing 1 is the important section block diagram of the communication system which applied this invention. Among the external terminals (a "client" is called hereafter) 30 and 31 connected to the wide area network 10, for example, the Internet, respectively, a site 300 connects mutually the communication device (a "server" is called hereafter) 310 in which two-way communication is possible, and the proxy server 320 used as an example of proxy (proxy) equipment through an internal network, and is constituted.

[0014] The server 310 is equipped with the interface device 311 to which the private address b was assigned, and the interface device 312 to which the global address F was assigned.

[0015] It is the substitute communication device equipped with the function to execute transmission and reception of the data between clients 30 and 31 and a server 310 by proxy, a proxy server 320 is changing the address of a data transmission place into the transmission place address of self while it changes the address of data transmitting origin into the transmitting agency address of self, and it forms the data transceiver gestalt between clients 30 and 31 and a server 310 virtually. This proxy server 320 is equipped with the interface device 321 to which the private address c was assigned, and the interface device 322 to which the global address D was assigned.

[0016] In the example of drawing 1 , interface devices 311 and 321 perform control to control the internal two-way communication between the server 310-proxy servers 320 through an internal network (local communication link), and for interface devices 312 and 322 each, connect a server 310 and a proxy server 320 to the Internet 10, respectively. In addition, in the communication system of this operation gestalt, the data transmitted and received between a server 310 and each clients 30 and 31 shall be divided under a fixed regulation, and shall be performed in the form of [which the destination label attached] a packet. Hereafter, the data transmitted and received may be called a "packet."

[0017] Actuation of the communication system of this operation gestalt is as follows. Here, the case where the client 30 to which Address A was assigned, and the client 31 to which Address E was assigned publish a data Request to Send towards a server 310 at a coincidence term is explained.

[0018] The data Request to Send from a client 30 shall be published to the proxy server 320 which has an interface device 322. A proxy server 320 will publish a data Request to Send to a server 310 instead of a client 30, if this data Request to Send is received. The publishing agency address of the data Request to Send at this time turns into Address c. That is, the address A of the client 30 which is the issue origin of a data Request to Send from the first is changed into the address c of a proxy server 320, and is sent to a server 310. Although a server 310 transmits a response packet corresponding to this data Request to Send, the transmission place of the response packet at this time serves as a proxy server 320. Once a proxy server 320 changes into Address c the address b by the side of the server 310 which transmitted the response packet, it changes this into the address D of an interface device 322, and transmits the response packet which includes this address D in a header unit to a client 30.

[0019] A server 310 does not need to be conscious of the address A of the issue origin (client

30) of a data Request to Send, and just comes to answer the proxy server 320 by adopting such a gestalt in the data (packet) demanded from the proxy server 320. On the other hand, direct access of the client 31 can be carried out to a server 310 through the interface device 312 with a channel 21 and Address F.

[0020] That is, from the Internet 10 side (a client 30 side, 31 sides), it is visible as if the server with Address D and the server with Address F existed independently, respectively. On the other hand, a local communication link is performed between a server 310 and a proxy server 320. Consequently, the mirror site which has two servers virtually can be built by one set of a server 310, and it becomes possible to distribute the traffic in a server 310 simply and suitable for two channels 20 and 21. Moreover, since it is not necessary to install two sets of servers, a manufacturing cost and maintenance employment expense become cheap.

[0021] (The 2nd operation gestalt) Drawing 2 is drawing having shown the example of a configuration of the communication system which formed the above-mentioned proxy server 320 and the proxy servers 420 and 430 of the same function between a server 410 and channels 20 and 21, respectively. One site where the sign 400 arranged this communication system, the interface device (the interface devices 311 and 312 and this function of the 1st operation gestalt) which a server 410 equips with 411 and 412, and 421, 422, 431 and 432 are interface devices (the interface devices 321 and 322 and this function of the 1st operation gestalt) with which each proxy servers 420 and 430 are equipped.

[0022] With the communication system of this operation gestalt as well as the communication system of the 1st operation gestalt, two servers can be virtually built by the single server 410. The other party of data transmission and reception of the server 410 in this case always becomes proxy servers 420 and 430. Consequently, it becomes possible to distribute simply and appropriately the traffic in the server 410 when there is a data Request to Send from two clients 30 and 31.

[0023] (The 3rd operation gestalt) Drawing 3 is the block diagram of the communication system which can distribute traffic, without making a proxy server intervene. Although the channels 20 and 21 which constitute a part use the Internet 10 the same as the thing of the 1st and 2nd operation gestalt and it is not illustrated for convenience, two or more clients shall be connected to the Internet 10. The server 510 used as an example of the communication system in this case equips each of two channels 20 and 21 with the interface devices 511 and 512 corresponding to 1 to 1. The respectively global address is assigned to these interface devices 511 and 512.

[0024] First, the structure of the packet (a data Request to Send, response packet) used in this operation gestalt is explained. Data characteristics, such as a transmitting agency, and a communications protocol besides the address of a transmission place, are usually included in the header unit of this kind of packet as additional information. Drawing 4 (a) - (c) is drawing which illustrated the example of a frame structure of a response packet, and the response packet to which Packets A and C are transmitted through an interface device 511 (address 255.20.34.12), and Packet B are packets transmitted through an interface device 512 (address: 255.20.34.13). The transmission place of these packet A-C serves as a client (address: 155.19.25.37, 175.20.35.10, 185.45.67.21) different, respectively, and, as for HTTP and Packet B, also in the classification of a communications protocol, Packets A and C serve as FTP.

[0025] The thing [priority] according to a packet is recorded. A "priority" is an index which shows the significance (or quality) of the response for example, according to the contents of service. That is, it is not to concern a server 510 with reception sequence, but transmit a response packet sequentially from what has a high priority to the data Request to Send received within a fixed period. In addition, the same header unit is added also about the data Request to Send, and it is used in the various distinction sections 513-516 mentioned later for the specification of a data characteristic.

[0026] The output interface management section 17 performs control for choosing either of the interface devices 511 and 512 at the time of management of routing table 518, and transmission of the response packet according to the data Request to Send from a client, and drawing a response packet at it. Selection of interface devices 511 and 512 is performed based on the newest contents of record of routing table 518 in principle.

[0027] Routing table 518 records the correlation information on each of interface devices 511 and 512, and a predetermined data characteristic in consideration of the engine performance of channels 20 and 21, quality, etc. Drawing 5 is drawing having shown the example of the contents of record of this routing table 518, and the data characteristic distinguished in the various distinction sections 513-516 mentioned later besides the transmission place address and the transmitting agency address is recorded. An "output interface device" is an interface device beforehand associated corresponding to each data characteristic.

[0028] The protocol distinction section 513 distinguishes the communications protocol used between clients as a data characteristic. If this communications protocol is FTP and HTTP, it is a mass channel and a data characteristic to choose the channel of small capacity, if it becomes other than this. The packet size distinction section 514 distinguishes the size of a packet size (data size) as a data characteristic. A packet size is a data characteristic to choose a mass channel, so that it is long. The output priority distinction section 515 distinguishes the priority of the response for example, corresponding to a data Request to Send as a data characteristic. This priority determines the sequence of a response according to the importance (or height of quality) of service as mentioned above, and also the thing which has a high priority can use it as a data characteristic to choose a more nearly mass channel. 1 byte of low order of a destination address [in / in the data bit distinction section 516 / the contents of data of the specific location of data, for example, a header unit,] distinguishes odd number or even number as said data characteristic.

[0029] These data characteristics can usually be distinguished in analyzing the contents of the header unit in the case of a data Request to Send. This is because the response packet of the contents according to the data Request to Send will be generated. However, you may make it distinguish the above-mentioned data characteristic from the header unit of a response packet. The distinction result by each distinction sections 513-516 is notified to the output interface management section 517, respectively, and the contents are recorded on routing table 518. In addition, the contents of the above-mentioned data characteristic are instantiation, and are not limited to these things.

[0030] Thus, in the communication system constituted, actuation when there is a data Request to Send from a certain client is as follows. The information on the header unit of a data Request to Send is sent to each distinction sections 513-516, and the data characteristic of the response packet which corresponds, respectively is distinguished. A distinction result is recorded on routing table 518 through the output interface management section 517. If a response packet is generated by the response packet generation means which is not illustrated, the output interface management section 517 will determine to which of interface devices 511 and 512 this response packet is led.

[0031] Although the contents of record of routing table 518 are followed as mentioned above in principle on the occasion of decision, it can also be based only on the distinction result of each distinction sections 513-516. For example, if the number of the tails of the address of a transmission place is odd, in the case of an interface device 511 and even number, an interface device 512 will be determined as an interface device for transmission of a response packet. Or if the protocol of a response packet is HTTP or FTP, an interface device 511 and when other, an interface device 512 will be determined as an interface device for transmission of a response packet. Or when a priority is "quantity" and an interface device 511 and a transmitting priority are "low", an interface device 512 is determined as an interface device for transmission of a response packet. Or the method of determining an interface device by combining suitably the address of the decision and the transmission place according to the merits and demerits of response packet length, a communications protocol, a priority, data size, etc. is also one of the gestalten of operation. According to this communication system, the traffic in a server 510 can be appropriately distributed now.

[0032] the communication link which the response (turn around time) of a server will improve and will be performed through the Internet by building the communication system of the 1st — the 3rd operation gestalt as mentioned above if it sees from a user —— breaking off (quality fluctuation) —— the decreasing effectiveness is acquired, if it sees on the other hand from the

side which provides this communication system with service information, the installation number of a server becomes fewer and the effectiveness that the cost which plant-and-equipment investment takes can reduce remarkably will be acquired. In order to build a mirror site logically by one set of a server, it becomes unnecessary moreover, to take the synchronization of an updating stage when it becomes unnecessary to have reproduced the contents in the case of building a mirror site by two sets of servers and there is modification of contents.
[0033] In addition, although the 1st - the 3rd operation gestalt showed the example in case the number of channels is two, this invention is applicable similarly about the case (in this case, the interface device corresponding to 1 to 1 is needed for each channel) of three or more channels.
[0034]
[Effect of the Invention] According to this invention, the traffic dispersion approach that distribution of traffic can be aimed at by simple technique can be offered now so that clearly from the above explanation. Moreover, the cheap communication system equipped with the traffic dispersion function can be offered.

[Translation done.]

* NOTICES *

TECHNICAL FIELD

[The technical field to which invention belongs] This invention relates to the technique which controls concentration of the traffic in the server connected to the Internet.

[0002]

[Background of the Invention] It is common that service which performs information offer by WWW (World Wide Web) of the Internet, FTP (File Transfer Protocol), etc. is offered through a network service provider (it is called a "provider" for short Network Service Provider and the following). Service which a provider offers is offered when a user mainly accesses at arbitration the server which accumulates information. For this reason, if access from a user concentrates on a provider's server, in the channel which that provider is preparing, delay of traffic may occur or delay of traffic may occur in the channel between the servers and providers who are accumulating information. When such delay occurs, enjoyment of smooth information becomes impossible to a user.

[0003] Then, in order to cancel delay of traffic, it is performed that both users make two or more servers distribute traffic by accumulating the same accessible information ("mirror information") conventionally. Generally the location which offers mirror information is called the "mirror site." The mirror site serves as two or more sites and a gestalt to which two sites 100 and 110 were connected more simply at the Internet 10, as shown in drawing 6 . In the server 101 and the site 110, the server 111 is arranged by the site 100, respectively. Mirror information is accumulated in each servers 101 and 111, respectively, and the interface devices 102 and 112 for controlling connection between an internal network and channels 20 and 21 etc. are arranged further. By preparing such a mirror site, it is lost that access from a user concentrates on one server, and distribution of traffic is attained. However, if a mirror site is prepared, the cost which at least two lines [at least two], i.e., a server, are needed, and construction of a system and a maintenance take to the independent site (server) will become large.

[0004] The gestalt which distributes the traffic in the server concerned can be considered by preparing the interface device which can connect either of two or more channels to one set of a server alternatively as a solution means of such a problem, for example, a router. That is, as shown in drawing 7 , the interface devices 211 and 212 for connecting self and the Internet 10 to one set of the server 210 currently prepared for the site 200 through either of two channels 20 and 21 are arranged, and traffic is distributed.

[0005] However, traffic is not necessarily well distributed by channels 20 and 21 only by arranging two or more interface devices 211 and 212 like illustration. In case a server 210 transmits data according to a demand of a user, this is because the suitable interface device cannot be specified surely, in order not to memorize the information on the passed data, when many of operating systems (Operating System) used for a server 210 receive the data transmitted by the user.

[0006] That is, in a server equipped with a router, it is decided whether to transmit data using which channel by the contents of record of the routing table with which a server is equipped. For example, if it is data transmission to the communication device with which IP (internet protocol) address which a server 210 manages was assigned, with reference to routing table, the channel connected to the communication device can be specified. However, when transmitting the data

which answer a data Request to Send from the communication device with which the unspecified address, for example, a global address, was assigned, since the IP address of the communication device is unrecordable on routing table, a site 210 cannot specify the channel (that is, interface device) used in case the data which answer are transmitted. For this reason, traffic cannot be distributed well.

[0007] Then, this invention makes it a technical problem to offer the traffic control approach which enables distribution of traffic by simple technique. Other technical problems of this invention are to offer the cheap communication system equipped with the traffic dispersion function.

[Translation done.]

* NOTICES *

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damages caused by the use of this translation.

1.This document has been translated by computer. So the translation may not reflect the original
precisely.
2.**** shows the word which can not be translated.
3.In the drawings, any words are not translated.

EFFECT OF THE INVENTION

[Effect of the Invention] According to this invention, the traffic dispersion approach that
distribution of traffic can be aimed at by simple technique can be offered now so that clearly
from the above explanation. Moreover, the cheap communication system equipped with the
traffic dispersion function can be offered.

[Translation done.]

MEANS

[Means for Solving the Problem] The traffic control approach of the 1st invention which solves the above-mentioned technical problem It is the approach performed in the equipment which performs data transmission and reception between external terminals, using either of two or more channels alternatively. Between a part or all of two or more of said channels, and said equipment Make the proxy equipment which executes processing about said data transmission and reception by proxy, respectively intervene, and a logical mirror site is built. Between each proxy equipment and said equipment, it is characterized by distributing the traffic in the equipment concerned by performing a local communication link and communicating the gestalt depending on the channel connected to the proxy equipment concerned between each proxy equipment and said external terminal.

[0009] The traffic control approach of the 2nd invention is an approach performed in the equipment which transmits response data to the addressing to an external terminal concerned through either of two or more channels when a data Request to Send is received from an external terminal. Relate each of two or more of said channels with the predetermined data characteristic, and the data characteristic of the response data concerned is specified in the case of transmission of the response data to said external terminal. By leading said response data to the channel which suits this specified data characteristic, it is characterized by distributing the traffic in said equipment.

[0010] Here, a predetermined data characteristic is information determined according to each engine performance or quality of a channel including at least one of the size of the communications protocol used between for example, the aforementioned external terminals, and said response data, the contents of data of a specific location, and the priority **s of a response. This data characteristic may be specified from the header of response data etc., or you may make it specify it based on the contents of said data Request to Send which received. Moreover, the proxy equipment which executes processing about said data transmission and reception by proxy, respectively is made to intervene between a part or all of two or more of said channels, and said equipment, and it may be made to perform transmission of the response data to said external terminal through said proxy equipment at least.

[0011] The communication system of this invention which solves a technical problem besides the above In the communication system equipped with the communication device which performs data transmission and reception between external terminals, using either of two or more channels alternatively Arrange the proxy equipment which executes processing about said data transmission and reception by proxy, respectively between a part or all of two or more of said channels, and said communication device, and a logical mirror site is built with each proxy equipment and said communication device to it. Between each proxy equipment and said communication device, a local communication link is performed, and between each proxy equipment and said external terminal, it constitutes so that the gestalt depending on the channel connected to the proxy equipment concerned may be communicated. Said proxy equipment is changing the address of a data transmission place into the transmission place address of self while changing the address of for example, data transmitting origin into the transmitting agency address of self, and it forms the data transceiver gestalt between said external terminals and

said communication devices virtually.

[0012] In the communication system which transmits response data to the addressing to an external terminal concerned through either of two or more channels when the communication system concerning other configurations of this invention receives a data Request to Send from an external terminal Two or more interface devices for corresponding to each of two or more of said channels, and 1 to 1, and enabling the communication link between each channels, While holding the correlation information on a distinction means to distinguish the data characteristic of response data based on said data Request to Send, and each of two or more of said interface devices and a predetermined data characteristic The interface device corresponding to the data characteristic distinguished with said distinction means is specified based on said correlation information, and it is characterized by forming the management tool which leads said response data to said specified interface device.

[0013]

[Embodiment of the Invention] Hereafter, the gestalt of operation of this invention is explained with reference to a drawing.

(The 1st operation gestalt) Drawing 1 is the important section block diagram of the communication system which applied this invention. Among the external terminals (a "client" is called hereafter) 30 and 31 connected to the wide area network 10, for example, the Internet, respectively, a site 300 connects mutually the communication device (a "server" is called hereafter) 310 in which two-way communication is possible, and the proxy server 320 used as an example of proxy (proxy) equipment through an internal network, and is constituted.

[0014] The server 310 is equipped with the interface device 311 to which the private address b was assigned, and the interface device 312 to which the global address F was assigned.

[0015] It is the substitute communication device equipped with the function to execute transmission and reception of the data between clients 30 and 31 and a server 310 by proxy, a proxy server 320 is changing the address of a data transmission place into the transmission place address of self while it changes the address of data transmitting origin into the transmitting agency address of self, and it forms the data transceiver gestalt between clients 30 and 31 and a server 310 virtually. This proxy server 320 is equipped with the interface device 321 to which the private address c was assigned, and the interface device 322 to which the global address D was assigned.

[0016] In the example of drawing 1 , interface devices 311 and 321 perform control to control the internal two-way communication between the server 310-proxy servers 320 through an internal network (local communication link), and for interface devices 312 and 322 each, connect a server 310 and a proxy server 320 to the Internet 10, respectively. In addition, in the communication system of this operation gestalt, the data transmitted and received between a server 310 and each clients 30 and 31 shall be divided under a fixed regulation, and shall be performed in the form of [which the destination label attached] a packet. Hereafter, the data transmitted and received may be called a "packet."

[0017] Actuation of the communication system of this operation gestalt is as follows. Here, the case where the client 30 to which Address A was assigned, and the client 31 to which Address E was assigned publish a data Request to Send towards a server 310 at a coincidence term is explained.

[0018] The data Request to Send from a client 30 shall be published to the proxy server 320 which has an interface device 322. A proxy server 320 will publish a data Request to Send to a server 310 instead of a client 30, if this data Request to Send is received. The publishing agency address of the data Request to Send at this time turns into Address c. That is, the address A of the client 30 which is the issue origin of a data Request to Send from the first is changed into the address c of a proxy server 320, and is sent to a server 310. Although a server 310 transmits a response packet corresponding to this data Request to Send, the transmission place of the response packet at this time serves as a proxy server 320. Once a proxy server 320 changes into Address c the address b by the side of the server 310 which transmitted the response packet, it changes this into the address D of an interface device 322, and transmits the response packet which includes this address D in a header unit to a client 30.

[0019] A server 310 does not need to be conscious of the address A of the issue origin (client 30) of a data Request to Send, and just comes to answer the proxy server 320 by adopting such a gestalt in the data (packet) demanded from the proxy server 320. On the other hand, direct access of the client 31 can be carried out to a server 310 through the interface device 312 with a channel 21 and Address F.

[0020] That is, from the Internet 10 side (a client 30 side, 31 sides), it is visible as if the server with Address D and the server with Address F existed independently, respectively. On the other hand, a local communication link is performed between a server 310 and a proxy server 320. Consequently, the mirror site which has two servers virtually can be built by one set of a server 310, and it becomes possible to distribute the traffic in a server 310 simply and suitable for two channels 20 and 21. Moreover, since it is not necessary to install two sets of servers, a manufacturing cost and maintenance employment expense become cheap.

[0021] (The 2nd operation gestalt) Drawing 2 is drawing having shown the example of a configuration of the communication system which formed the above-mentioned proxy server 320 and the proxy servers 420 and 430 of the same function between a server 410 and channels 20 and 21, respectively. One site where the sign 400 arranged this communication system, the interface device (the interface devices 311 and 312 and this function of the 1st operation gestalt) which a server 410 equips with 411 and 412, and 421, 422, 431 and 432 are interface devices (the interface devices 321 and 322 and this function of the 1st operation gestalt) with which each proxy servers 420 and 430 are equipped.

[0022] With the communication system of this operation gestalt as well as the communication system of the 1st operation gestalt, two servers can be virtually built by the single server 410. The other party of data transmission and reception of the server 410 in this case always becomes proxy servers 420 and 430. Consequently, it becomes possible to distribute simply and appropriately the traffic in the server 410 when there is a data Request to Send from two clients 30 and 31.

[0023] (The 3rd operation gestalt) Drawing 3 is the block diagram of the communication system which can distribute traffic, without making a proxy server intervene. Although the channels 20 and 21 which constitute a part use the Internet 10 the same as the thing of the 1st and 2nd operation gestalt and it is not illustrated for convenience, two or more clients shall be connected to the Internet 10. The server 510 used as an example of the communication system in this case equips each of two channels 20 and 21 with the interface devices 511 and 512 corresponding to 1 to 1. The respectively global address is assigned to these interface devices 511 and 512.

[0024] First, the structure of the packet (a data Request to Send, response packet) used in this operation gestalt is explained. Data characteristics, such as a transmitting agency, and a communications protocol besides the address of a transmission place, are usually included in the header unit of this kind of packet as additional information. Drawing 4 (a) − (c) is drawing which illustrated the example of a frame structure of a response packet, and the response packet to which Packets A and C are transmitted through an interface device 511 (address 255.20.34.12), and Packet B are packets transmitted through an interface device 512 (address: 255.20.34.13). The transmission place of these packet A−C serves as a client (address: 155.19.25.37, 175.20.35.10, 185.45.67.21) different, respectively, and, as for HTTP and Packet B, also in the classification of a communications protocol, Packets A and C serve as FTP.

[0025] The thing [priority] according to a packet is recorded. A "priority" is an index which shows the significance (or quality) of the response for example, according to the contents of service. That is, it is not to concern a server 510 with reception sequence, but transmit a response packet sequentially from what has a high priority to the data Request to Send received within a fixed period. In addition, the same header unit is added also about the data Request to Send, and it is used in the various distinction sections 513−516 mentioned later for the specification of a data characteristic.

[0026] The output interface management section 17 performs control for choosing either of the interface devices 511 and 512 at the time of management of routing table 518, and transmission of the response packet according to the data Request to Send from a client, and drawing a response packet at it. Selection of interface devices 511 and 512 is performed based on the

newest contents of record of routing table 518 in principle.

[0027] Routing table 518 records the correlation information on each of interface devices 511 and 512, and a predetermined data characteristic in consideration of the engine performance of channels 20 and 21, quality, etc. Drawing 5 is drawing having shown the example of the contents of record of this routing table 518, and the data characteristic distinguished in the various distinction sections 513-516 mentioned later besides the transmission place address and the transmitting agency address is recorded. An "output interface device" is an interface device beforehand associated corresponding to each data characteristic.

[0028] The protocol distinction section 513 distinguishes the communications protocol used between clients as a data characteristic. If this communications protocol is FTP and HTTP, it is a mass channel and a data characteristic to choose the channel of small capacity, if it becomes other than this. The packet size distinction section 514 distinguishes the size of a packet size (data size) as a data characteristic. A packet size is a data characteristic to choose a mass channel, so that it is long. The output priority distinction section 515 distinguishes the priority of the response for example, corresponding to a data Request to Send as a data characteristic. This priority determines the sequence of a response according to the importance (or height of quality) of service as mentioned above, and also the thing which has a high priority can use it as a data characteristic to choose a more nearly mass channel. 1 byte of low order of a destination address [in / in the data bit distinction section 516 / the contents of data of the specific location of data, for example, a header unit,] distinguishes odd number or even number as said data characteristic.

[0029] These data characteristics can usually be distinguished in analyzing the contents of the header unit in the case of a data Request to Send. This is because the response packet of the contents according to the data Request to Send will be generated. However, you may make it distinguish the above-mentioned data characteristic from the header unit of a response packet. The distinction result by each distinction sections 513-516 is notified to the output interface management section 517, respectively, and the contents are recorded on routing table 518. In addition, the contents of the above-mentioned data characteristic are instantiation, and are not limited to these things.

[0030] Thus, in the communication system constituted, actuation when there is a data Request to Send from a certain client is as follows. The information on the header unit of a data Request to Send is sent to each distinction sections 513-516, and the data characteristic of the response packet which corresponds, respectively is distinguished. A distinction result is recorded on routing table 518 through the output interface management section 517. If a response packet is generated by the response packet generation means which is not illustrated, the output interface management section 517 will determine to which of interface devices 511 and 512 this response packet is led.

[0031] Although the contents of record of routing table 518 are followed as mentioned above in principle on the occasion of decision, it can also be based only on the distinction result of each distinction sections 513-516. For example, if the number of the tails of the address of a transmission place is odd, in the case of an interface device 511 and even number, an interface device 512 will be determined as an interface device for transmission of a response packet. Or if the protocol of a response packet is HTTP or FTP, an interface device 511 and when other, an interface device 512 will be determined as an interface device for transmission of a response packet. Or when a priority is "quantity" and an interface device 511 and a transmitting priority are "low", an interface device 512 is determined as an interface device for transmission of a response packet. Or the method of determining an interface device by combining suitably the address of the decision and the transmission place according to the merits and demerits of response packet length, a communications protocol, a priority, data size, etc. is also one of the gestalten of operation. According to this communication system, the traffic in a server 510 can be appropriately distributed now.

[0032] the communication link which the response (turn around time) of a server will improve and will be performed through the Internet by building the communication system of the 1st − the 3rd operation gestalt as mentioned above if it sees from a user −− breaking off (quality

fluctuation) — the decreasing effectiveness is acquired, if it sees on the other hand from the side which provides this communication system with service information, the installation number of a server becomes fewer and the effectiveness that the cost which plant-and-equipment investment takes can reduce remarkably will be acquired. In order to build a mirror site logically by one set of a server, it becomes unnecessary moreover, to take the synchronization of an updating stage when it becomes unnecessary to have reproduced the contents in the case of building a mirror site by two sets of servers and there is modification of contents.

[0033] In addition, although the 1st – the 3rd operation gestalt showed the example in case the number of channels is two, this invention is applicable similarly about the case (in this case, the interface device corresponding to 1 to 1 is needed for each channel) of three or more channels.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The block diagram of the 1st communication system which applied this invention.
[Drawing 2] The block diagram of the 2nd communication system which applied this invention.
[Drawing 3] The block diagram of the 3rd communication system which applied this invention.
[Drawing 4] (a) － (c) is the explanatory view having shown the example of a configuration of the
packet transmitted and received with communication system.
[Drawing 5] The explanatory view having shown the example of a configuration of routing table.
[Drawing 6] The block diagram of the conventional communication system which prepared two
servers.
[Drawing 7] The block diagram of the conventional communication system equipped with two
interface devices.
[Description of Notations]
10 Internet
20 21 Channel
30 31 Client
100 110,200,300,400 Site
320, 420, 430 Proxy server
101, 111, 210, 310, 410, 510 servers
102, 112, 211, 212, 321, 322, 311, 312, 411, 412, 421, 422, 431, 432, 511, and 512 Interface device

513 Protocol Distinction Section
514 Packet Size Distinction Section
515 Priority Distinction Section
516 Data Bit Distinction Section

[Translation done.]

最終頁に続く

(54)【発明の名称】　　トラヒック分散方法及び通信システム

(57)【要約】

【課題】　簡易な手法でトラヒックを分散することができる通信システムを提供する。

【解決手段】　複数のインタフェース装置511、512と、インターネット10からのデータ送信要求に基づいてデータ特性を判別する各種データ特性判別部513～516、及び、各データ特性判別部513～516で判別したデータ特性とインタフェース装置511、512とを関連付けることにより、どのインタフェース装置を介して応答データを送信するかを決定する送信インタフェース管理部517を備えて通信システムを構築する。
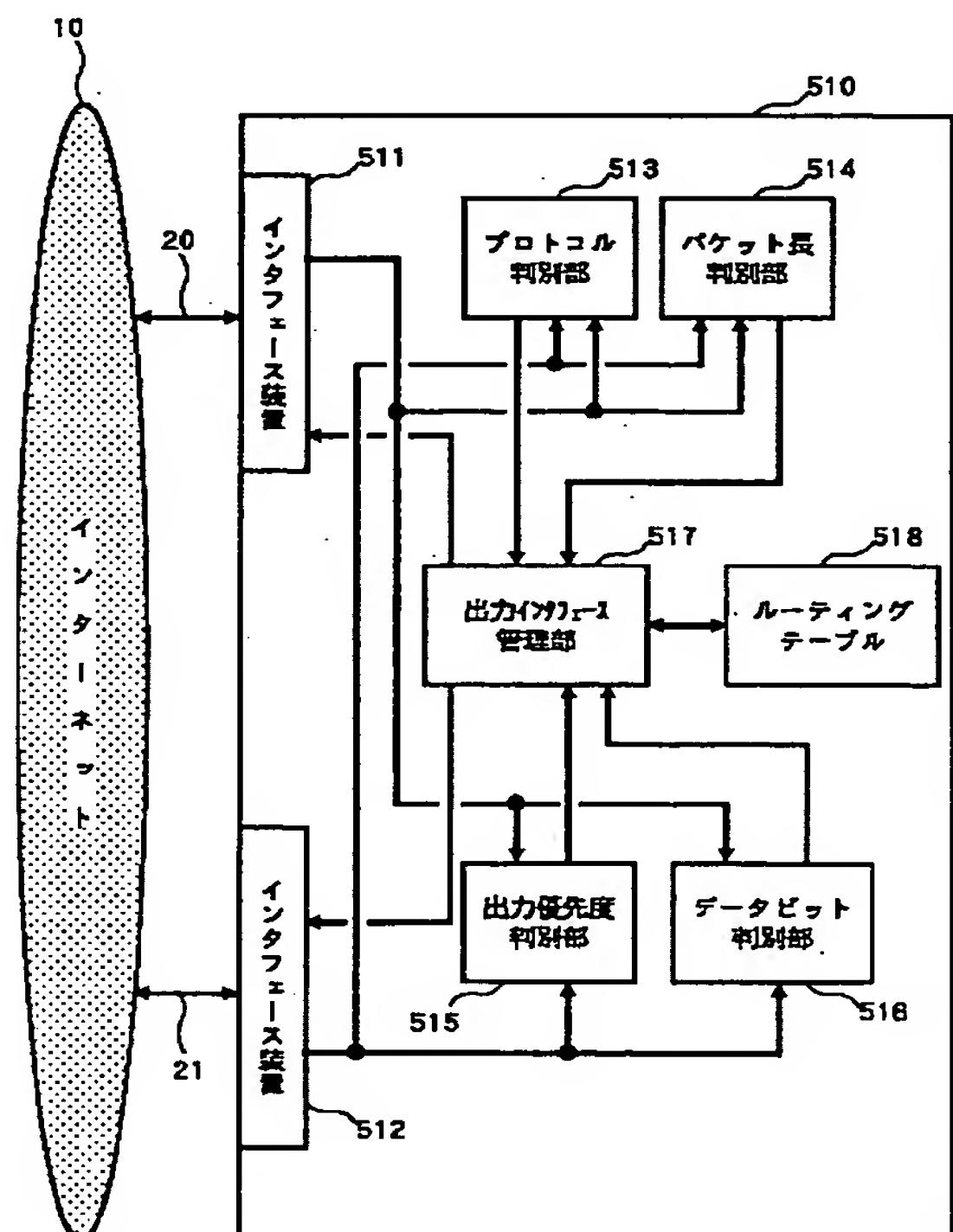
【特許請求の範囲】

【請求項１】 外部端末との間で複数の通信路のいずれかを選択的に使用してデータ送受信を行う装置において実行される方法であって、

前記複数の通信路の一部又は全部と前記装置との間に、それぞれ前記データ送受信に関する処理を代行するプロキシ装置を介在させて論理的なミラーサイトを構築し、個々のプロキシ装置と前記装置との間ではローカルな通信を行い、各プロキシ装置と前記外部端末との間では当該プロキシ装置に接続される通信路に依存した形態の通信を行うことにより、当該装置におけるトラヒックを分散させることを特徴とする、

トラヒック分散方法。

【請求項２】 外部端末からデータ送信要求を受信したときに当該外部端末宛に複数の通信路のいずれかを介して応答データを送信する装置において実行される方法であって、

前記複数の通信路の各々を所定のデータ特性と関連付けておき、前記外部端末への応答データの送信の際に当該応答データのデータ特性を特定し、この特定したデータ特性に適合する通信路へ前記応答データを導くことにより、前記装置におけるトラヒックを分散させることを特徴とする、トラヒック分散方法。

【請求項３】 前記所定のデータ特性が、前記外部端末との間で使用される通信プロトコル、前記応答データのサイズ、特定位置のデータ内容、応答の優先度、の少なくとも一つを含み、個々の通信路の性能又は品質に応じて決定される情報であることを特徴とする、

請求項２記載のトラヒック分散方法。

【請求項４】 前記受信したデータ送信要求の内容に基づいて、送信すべき前記応答データのデータ特性を特定することを特徴とする、

請求項２又は３記載のトラヒック分散方法。

【請求項５】 前記複数の通信路の一部又は全部と前記装置との間に、それぞれ前記データ送受信に関する処理を代行するプロキシ装置を介在させ、少なくとも前記外部端末への応答データの送信を前記プロキシ装置を通じて行うことを特徴とする、

請求項２又は３記載のトラヒック分散方法。

【請求項６】 外部端末との間で複数の通信路のいずれかを選択的に使用してデータ送受信を行う通信装置を備えた通信システムにおいて、

前記複数の通信路の一部又は全部と前記通信装置との間に、それぞれ前記データ送受信に関する処理を代行するプロキシ装置を配置して各プロキシ装置と前記通信装置とで論理的なミラーサイトを構築し、個々のプロキシ装置と前記通信装置との間ではローカルな通信を行い、各プロキシ装置と前記外部端末との間では当該プロキシ装置に接続される通信路に依存した形態の通信を行うように構成したことを特徴とする、通信シ

ステム。

【請求項７】 外部端末からデータ送信要求を受信したときに当該外部端末宛に複数の通信路のいずれかを介して応答データを送信する通信システムにおいて、

前記複数の通信路の各々と１対１に対応し個々の通信路との間の通信を可能にするための複数のインタフェース装置と、

前記データ送信要求に基づく応答データのデータ特性を判別する判別手段と、

前記複数のインタフェース装置の各々と所定のデータ特性との関連付け情報を保持するとともに、前記判別手段で判別されたデータ特性に対応するインタフェース装置を前記関連付け情報をもとに特定し、前記応答データを前記特定したインタフェース装置に導く管理手段と、

を設けたことを特徴とする通信システム。

【請求項８】 前記判別手段は、前記外部端末との間で使用される通信プロトコルを前記データ特性として判別するものであり、前記管理手段は、前記判別された通信プロトコルに準拠した通信路に接続されるインタフェース装置を特定することを特徴とする、

請求項７記載の通信システム。

【請求項９】 前記判別手段は、前記応答データのサイズの大小を前記データ特性として判別するものであり、前記管理手段は、前記判別されたサイズが大きい順に、大容量の通信路に接続されるインタフェース装置を特定することを特徴とする、

請求項７記載の通信システム。

【請求項１０】 前記判別手段は、前記応答データの特定位置のデータ内容を前記データ特性として判別するものであり、前記管理手段は、前記判別されたデータ内容毎に予め割り当てた通信路に接続されるインタフェース装置を特定することを特徴とする、

請求項７記載の通信システム。

【請求項１１】 前記判別手段は、前記データ送信要求に対応する応答の優先度を前記データ特性として判別するものであり、前記管理手段は、前記判別された優先度の高い順に、大容量の通信路に接続されるインタフェース装置を特定することを特徴とする、

請求項７記載の通信システム。

【発明の詳細な説明】

【０００１】

【発明が属する技術分野】この発明は、例えばインターネットに接続されたサーバにおけるトラヒックの集中を抑制する技術に関する。

【０００２】

【発明の背景】インターネットのＷＷＷ（World Wide Web）、ＦＴＰ（File Transfer Protocol）等により情報提供を行うサービスは、ネットワーク・サービス・プロバイダ（Network Service Provider、以下、「プロバイダ」と略称する）を通じて行われるのが一般的である。

プロバイダが行うサービスは、主として、情報を蓄積しておくサーバにユーザが任意にアクセスすることによって行われる。このため、プロバイダのサーバにユーザからのアクセスが集中すると、そのプロバイダが用意している通信路においてトラヒックの渋滞が発生したり、情報を蓄積しているサーバとプロバイダとの間の通信路にトラヒックの渋滞が発生したりする場合がある。このような渋滞が発生すると、ユーザは、スムーズな情報の享受ができなくなる。

【０００３】そこで、トラヒックの渋滞を解消するため、従来、複数のサーバに、共にユーザがアクセス可能な同一の情報（「ミラー情報」）を蓄積しておくことで、トラヒックを分散させることが行われている。ミラー情報の提供を行う場所は、一般に、「ミラーサイト」と呼ばれている。ミラーサイトは、図６に示されるように、例えばインターネット１０に、複数のサイト、より単純には二つのサイト１００、１１０が接続された形態となっている。サイト１００にはサーバ１０１、サイト１１０にはサーバ１１１がそれぞれ配備されている。各サーバ１０１、１１１には、それぞれミラー情報が蓄積されており、さらに、内部ネットワークと通信路２０、２１との接続等を制御するためのインタフェース装置１０２、１１２が配備されている。このようなミラーサイトを設けることにより、ユーザからのアクセスが一つのサーバに集中することがなくなり、トラフィックの分散が可能になる。しかしながら、ミラーサイトを設けると、独立したサイト（サーバ）が少なくとも２系統、つまり、サーバが少なくとも２台必要となり、システムの構築や維持管理に要するコストが大きくなってしまう。

【０００４】このような問題の解決手段として、１台のサーバに複数の通信路のいずれかを選択的に接続することができるインタフェース装置、例えばルータを設けることで、当該サーバにおけるトラヒックを分散させる形態が考えられる。つまり、図７に示されるように、サイト２００に用意されている１台のサーバ２１０に、自己とインターネット１０とを２つの通信路２０、２１のいずれかを介して接続できるようにするためのインタフェース装置２１１、２１２を配備してトラヒックを分散させる。

【０００５】しかし、図示のように単にインタフェース装置２１１、２１２を複数配備しただけでは、必ずしもトラヒックが通信路２０、２１にうまく分散されるとは限らない。これは、サーバ２１０に使用されるオペレーティングシステム（Operating System）の多くが、ユーザから送信されてくるデータを受信するときに、通過したデータの情報を記憶しておかないため、サーバ２１０がユーザの要求に応じてデータを送信する際に、その適切なインタフェース装置を正しく特定できないためである。

【０００６】つまり、ルータを備えるサーバにおいて、

いずれの通信路を用いてデータを送信するかは、サーバが備えるルーティングテーブルの記録内容により決まる。例えば、サーバ２１０が管理するＩＰ（internet protocol）アドレスが割り付けられた通信装置へのデータ送信であれば、ルーティングテーブルを参照して、その通信装置に接続されている通信路を特定することができる。しかし、不特定のアドレス、例えばグローバルアドレスが割り付けられた通信装置からのデータ送信要求に応答するデータを送信する場合、サイト２１０は、ルーティングテーブルにその通信装置のＩＰアドレスを記録しておくことができないため、応答するデータを送信する際に使用する通信路（つまりインタフェース装置）を特定することができない。このため、トラヒックをうまく分散できない。

【０００７】そこで本発明は、簡易な手法でトラヒックの分散を可能にするトラフィック制御方法を提供することを課題とする。本発明の他の課題は、トラヒック分散機能を備えた低廉な通信システムを提供することにある。

【０００８】
【課題を解決するための手段】上記課題を解決する第１発明のトラヒック制御方法は、外部端末との間で複数の通信路のいずれかを選択的に使用してデータ送受信を行う装置において実行される方法であって、前記複数の通信路の一部又は全部と前記装置との間に、それぞれ前記データ送受信に関する処理を代行するプロキシ装置を介在させて論理的なミラーサイトを構築し、個々のプロキシ装置と前記装置との間ではローカルな通信を行い、各プロキシ装置と前記外部端末との間では当該プロキシ装置に接続される通信路に依存した形態の通信を行うことにより、当該装置におけるトラヒックを分散させることを特徴とする。

【０００９】第２発明のトラヒック制御方法は、外部端末からデータ送信要求を受信したときに当該外部端末宛に複数の通信路のいずれかを介して応答データを送信する装置において実行される方法であって、前記複数の通信路の各々を所定のデータ特性と関連付けておき、前記外部端末への応答データの送信の際に当該応答データのデータ特性を特定し、この特定したデータ特性に適合する通信路へ前記応答データを導くことにより、前記装置におけるトラヒックを分散させることを特徴とする。

【００１０】ここで、所定のデータ特性とは、例えば、前記外部端末との間で使用される通信プロトコル、前記応答データのサイズ、特定位置のデータ内容、応答の優先度、の少なくとも一つを含み、個々の通信路の性能又は品質に応じて決定される情報である。このデータ特性は、応答データのヘッダ等から特定しても良く、あるいは、前記受信したデータ送信要求の内容に基づいて特定するようにしても良い。また、前記複数の通信路の一部又は全部と前記装置との間に、それぞれ前記データ送受

信に関する処理を代行するプロキシ装置を介在させ、少なくとも前記外部端末への応答データの送信を前記プロキシ装置を通じて行うようにしても良い。

【００１１】上記他の課題を解決する本発明の通信システムは、外部端末との間で複数の通信路のいずれかを選択的に使用してデータ送受信を行う通信装置を備えた通信システムにおいて、前記複数の通信路の一部又は全部と前記通信装置との間にそれぞれ前記データ送受信に関する処理を代行するプロキシ装置を配置して各プロキシ装置と前記通信装置とで論理的なミラーサイトを構築し、個々のプロキシ装置と前記通信装置との間ではローカルな通信を行い、各プロキシ装置と前記外部端末との間では当該プロキシ装置に接続される通信路に依存した形態の通信を行うように構成したものである。前記プロキシ装置は、例えば、データ送信元のアドレスを自己の送信元アドレスに変換するとともにデータ送信先のアドレスを自己の送信先アドレスに変換することで、仮想的に前記外部端末と前記通信装置との間のデータ送受信形態を形成するものである。

【００１２】本発明の他の構成に係る通信システムは、外部端末からデータ送信要求を受信したときに当該外部端末宛に複数の通信路のいずれかを介して応答データを送信する通信システムにおいて、前記複数の通信路の各々と１対１に対応し個々の通信路との間の通信を可能にするための複数のインタフェース装置と、前記データ送信要求に基づく応答データのデータ特性を判別する判別手段と、前記複数のインタフェース装置の各々と所定のデータ特性との関連付け情報を保持するとともに、前記判別手段で判別されたデータ特性に対応するインタフェース装置を前記関連付け情報をもとに特定し、前記応答データを前記特定したインタフェース装置に導く管理手段とを設けたことを特徴とする。

【００１３】
【発明の実施の形態】以下、図面を参照して本発明の実施の形態を説明する。

（第１実施形態）図１は、本発明を適用した通信システムの要部構成図である。サイト３００は、それぞれ広域通信網、例えばインターネット１０に接続された外部端末（以下、「クライアント」と称する）３０、３１との間で双方向通信が可能な通信装置（以下、「サーバ」と称する）３１０と、プロキシ（proxy）装置の一例となるプロキシサーバ３２０とを内部ネットワークを介して相互に接続して構成されている。

【００１４】サーバ３１０は、プライベートなアドレスｂが割り付けられたインタフェース装置３１１と、グローバルなアドレスＦが割り付けられたインタフェース装置３１２とを備えている。

【００１５】プロキシサーバ３２０は、クライアント３０、３１とサーバ３１０との間のデータの送受信を代行する機能を備えた代理通信装置であり、データ送信元の

アドレスを自己の送信元アドレスに変換するとともにデータ送信先のアドレスを自己の送信先アドレスに変換することで、仮想的にクライアント３０、３１とサーバ３１０との間のデータ送受信形態を形成するものである。このプロキシサーバ３２０には、プライベートなアドレスｃが割り付けられたインタフェース装置３２１と、グローバルなアドレスＤが割り付けられたインタフェース装置３２２が備えられている。

【００１６】図１の例では、インタフェース装置３１１、３２１は、それぞれ内部ネットワークを介したサーバ３１０－プロキシサーバ３２０間の内部的な双方向通信（ローカル通信）を制御するものであり、インタフェース装置３１２、３２２は、サーバ３１０及びプロキシサーバ３２０をそれぞれインターネット１０に接続するための制御を行うものである。なお、本実施形態の通信システムにおいて、サーバ３１０と各クライアント３０、３１との間で送受信されるデータは、一定の規則で区切られ、宛先ラベルのついたパケットの形式で行われるものとする。以下、送受信されるデータを「パケット」と称する場合がある。

【００１７】本実施形態の通信システムの動作は、以下のようになる。ここでは、アドレスＡが割り当てられたクライアント３０と、アドレスＥが割り当てられたクライアント３１とが同時期にサーバ３１０に向けてデータ送信要求を発行した場合について説明する。

【００１８】クライアント３０からのデータ送信要求は、インタフェース装置３２２を有するプロキシサーバ３２０に対して発行されるものとする。プロキシサーバ３２０は、このデータ送信要求を受け付けると、クライアント３０に代わって、サーバ３１０へデータ送信要求を発行する。このときのデータ送信要求の発行元アドレスは、アドレスｃとなる。即ち、もともとのデータ送信要求の発行元であるクライアント３０のアドレスＡが、プロキシサーバ３２０のアドレスｃに変換され、サーバ３１０へ送られる。サーバ３１０は、このデータ送信要求に対応して応答パケットを送信するが、このときの応答パケットの送信先は、プロキシサーバ３２０となる。プロキシサーバ３２０は、応答パケットを送信したサーバ３１０側のアドレスｂをアドレスｃに一旦変換した後、これをインタフェース装置３２２のアドレスＤに変換し、このアドレスＤをヘッダ部に含む応答パケットをクライアント３０宛に送信する。

【００１９】このような形態を採用することで、サーバ３１０は、データ送信要求の発行元（クライアント３０）のアドレスＡを意識する必要がなく、プロキシサーバ３２０から要求されたデータ（パケット）をそのプロキシサーバ３２０宛に返信すればよくなる。一方、クライアント３１は、通信路２１及びアドレスＦを持つインタフェース装置３１２を介してサーバ３１０に直接アクセスすることができる。

【００２０】つまり、インターネット１０側（クライアント３０、３１側）からは、アドレスＤを持つサーバと、アドレスＦを持つサーバとがそれぞれ独立して存在しているかのように見える。一方、サーバ３１０とプロキシサーバ３２０との間ではローカル通信が行われる。この結果、１台のサーバ３１０で、仮想的に２つのサーバをもつミラーサイトを構築することができ、サーバ３１０におけるトラヒックを２つの通信路２０、２１に簡易且つ適切に分散することが可能になる。また、２台のサーバを設置する必要がないので、製造コストや維持運用費が低廉になる。

【００２１】（第２実施形態）図２は、サーバ４１０と通信路２０、２１との間に、それぞれ上述のプロキシサーバ３２０と同一機能のプロキシサーバ４２０、４３０を設けた通信システムの構成例を示した図である。符号４００は、この通信システムを配した一つのサイト、４１１、４１２はサーバ４１０が備えるインタフェース装置（第１実施形態のインタフェース装置３１１、３１２と同機能）、４２１、４２２、４３１、４３２は、各プロキシサーバ４２０、４３０が備えるインタフェース装置（第１実施形態のインタフェース装置３２１、３２２と同機能）である。

【００２２】この実施形態の通信システムでも、第１実施形態の通信システムと同様にして、単一のサーバ４１０により２つのサーバを仮想的に構築することができる。この場合のサーバ４１０のデータ送受信の相手方は、常にプロキシサーバ４２０、４３０となる。その結果、二つのクライアント３０、３１からデータ送信要求があったときのサーバ４１０におけるトラヒックを簡易且つ適切に分散することが可能になる。

【００２３】（第３実施形態）図３は、プロキシサーバを介在させずにトラヒックを分散することができる通信システムのブロック図である。便宜上、インターネット１０を一部を構成する通信路２０、２１は第１及び第２実施形態のものと同じとし、図示しないが、インターネット１０には、複数のクライアントが接続されているものとする。この場合の通信システムの一例となるサーバ５１０は、２つの通信路２０、２１の各々に１対１に対応するインタフェース装置５１１、５１２を備えている。これらのインタフェース装置５１１、５１２には、それぞれグローバルなアドレスが割り付けられている。

【００２４】まず、この実施形態において使用されるパケット（データ送信要求、応答パケット）の構造について説明する。この種のパケットのヘッダ部には、通常、送信元や送信先のアドレスのほか、通信プロトコル等のデータ特性が付加情報として含まれる。例えば図４（ａ）～（ｃ）は、応答パケットのフレーム構成例を例示した図であり、パケットＡ、Ｃはインタフェース装置５１１（アドレス２５５．２０．３４．１２）を通じて送信される応答パケット、パケットＢはインタフェース装置５１２

（アドレス：２５５．２０．３４．１３）を通じて送信されるパケットである。これらのパケットＡ～Ｃの送信先は、それぞれ異なるクライアント（アドレス：１５５．１９．２５．３７、１７５．２０．３５．１０、１８５．４５．６７．２１）となっており、通信プロトコルの種別も、パケットＡ、ＣはＨＴＴＰ、パケットＢはＦＴＰとなっている。

【００２５】優先度もパケットに応じたものが記録されるようになっている。「優先度」とは、例えばサービス内容に応じた応答の重要度（あるいは品質）を示す指標である。つまり、サーバ５１０が一定期間内に受け付けたデータ送信要求に対し、受付順番に関わらず、優先度の高いものから順に応答パケットを送信できるようにするためのものである。なお、データ送信要求についても同様のヘッダ部が付加されており、後述する各種判別部５１３～５１６においてデータ特性の特定のために使用されるようになっている。

【００２６】出力インタフェース管理部１７は、ルーティングテーブル５１８の管理と、クライアントからのデータ送信要求に応じた応答パケットの送信時にインタフェース装置５１１、５１２のいずれかを選択して応答パケットを導くための制御とを行うものである。インタフェース装置５１１、５１２の選択は、原則として、ルーティングテーブル５１８の最新の記録内容に基づいて行われる。

【００２７】ルーティングテーブル５１８は、通信路２０、２１の性能、品質等を考慮して、インタフェース装置５１１、５１２の各々と所定のデータ特性との関連付け情報を記録するものである。図５は、このルーティングテーブル５１８の記録内容例を示した図であり、送信先アドレス、送信元アドレスのほか、後述する各種判別部５１３～５１６で判別されたデータ特性が記録されるようになっている。「出力インタフェース装置」は、各データ特性に対応して予め関連付けられたインタフェース装置である。

【００２８】プロトコル判別部５１３は、クライアントとの間で使用される通信プロトコルをデータ特性として判別するものである。この通信プロトコルは、例えばＦＴＰやＨＴＴＰなら大容量の通信路、それ以外ならば小容量の通信路が選択されるようにするためのデータ特性である。パケット長判別部５１４は、例えば、パケット長（データサイズ）の大小をデータ特性として判別するものである。パケット長は、それが長いほど大容量の通信路が選択されるようにするためのデータ特性である。出力優先度判別部５１５は、例えば、データ送信要求に対応する応答の優先度をデータ特性として判別するものである。この優先度は、前述のようにサービスの重要性（または品質の高さ）に応じて応答の順序を決定するほか、優先度が高いものほど、より大容量の通信路が選択されるようにするためのデータ特性として使用することができる。データビット判別部５１６は、データの特定

位置のデータ内容、例えばヘッダ部における宛先アドレスの下位１バイトが奇数か偶数かを前記データ特性として判別するものである。

【００２９】これらのデータ特性は、通常、データ送信要求の際に、そのヘッダ部の内容を解析することで判別が可能である。これは、そのデータ送信要求に応じた内容の応答パケットが生成されることになるからである。但し、応答パケットのヘッダ部から上記データ特性を判別するようにしても良い。各判別部５１３〜５１６による判別結果は、それぞれ出力インタフェース管理部５１７に通知され、その内容がルーティングテーブル５１８に記録されるようになっている。なお、上記データ特性の内容は例示であり、これらのものに限定されるものではない。

【００３０】このように構成される通信システムにおいて、あるクライアントからデータ送信要求があったときの動作は、以下のようになる。データ送信要求のヘッダ部の情報が各判別部５１３〜５１６に送られ、それぞれ対応する応答パケットのデータ特性が判別される。判別結果は、出力インタフェース管理部５１７を通じてルーティングテーブル５１８に記録される。図示しない応答パケット生成手段で応答パケットが生成されると、出力インタフェース管理部５１７は、この応答パケットをインタフェース装置５１１、５１２のどちらに導くかを決定する。

【００３１】決定に際しては、原則として上述のようにルーティングテーブル５１８の記録内容に従うが、各判別部５１３〜５１６の判別結果のみに基づくこともできる。例えば、送信先のアドレスの末尾が奇数であればインタフェース装置５１１、偶数の場合はインタフェース装置５１２を応答パケットの送信用のインタフェース装置として決定する。あるいは、応答パケットのプロトコルがＨＴＴＰ又はＦＴＰであればインタフェース装置５１１、それ以外の場合はインタフェース装置５１２を応答パケットの送信用のインタフェース装置として決定する。あるいは、優先度が”高”の場合はインタフェース装置５１１、送信優先度が”低”の場合はインタフェース装置５１２を応答パケットの送信用のインタフェース装置として決定する。あるいは、応答パケット長の長短に応じた決定、送信先のアドレス、通信プロトコル、優先度、データサイズ等を適宜組み合わせることで、インタフェース装置を決定する方法も実施の形態の一つである。この通信システムによれば、サーバ５１０におけるトラヒックを適切に分散できるようになる。

【００３２】以上のように第１〜第３実施形態の通信システムを構築することで、ユーザからみれば、サーバのレスポンス（ターンアラウンドタイム）が向上し、インターネットを通じて行う通信の途切れ（品質変動）が少

なくなる効果が得られ、一方、この通信システムにサービス情報を提供する側からみれば、サーバの設置台数が減り、設備投資に要するコストを著しく低減させることができるという効果が得られる。また、１台のサーバで論理的にミラーサイトを構築するため、２台のサーバでミラーサイトを構築する場合のコンテンツの複製を行う必要なくなり、また、コンテンツの変更があったときの更新時期の同期をとる必要もなくなる。

【００３３】なお、第１〜第３実施形態では、通信路が２つの場合の例を示したが、３以上の通信路の場合（この場合は各々の通信路に１対１に対応したインタフェース装置が必要になる）についても、同様に、本発明を適用できるものである。

【００３４】

【発明の効果】以上の説明から明らかなように、本発明によれば、簡易な手法でトラヒックの分散を図ることができるトラヒック分散方法を提供できるようになる。また、トラヒック分散機能を備えた、低廉な通信システムを提供することができる。

【図面の簡単な説明】

【図１】本発明を適用した第１の通信システムのブロック図。

【図２】本発明を適用した第２の通信システムのブロック図。

【図３】本発明を適用した第３の通信システムのブロック図。

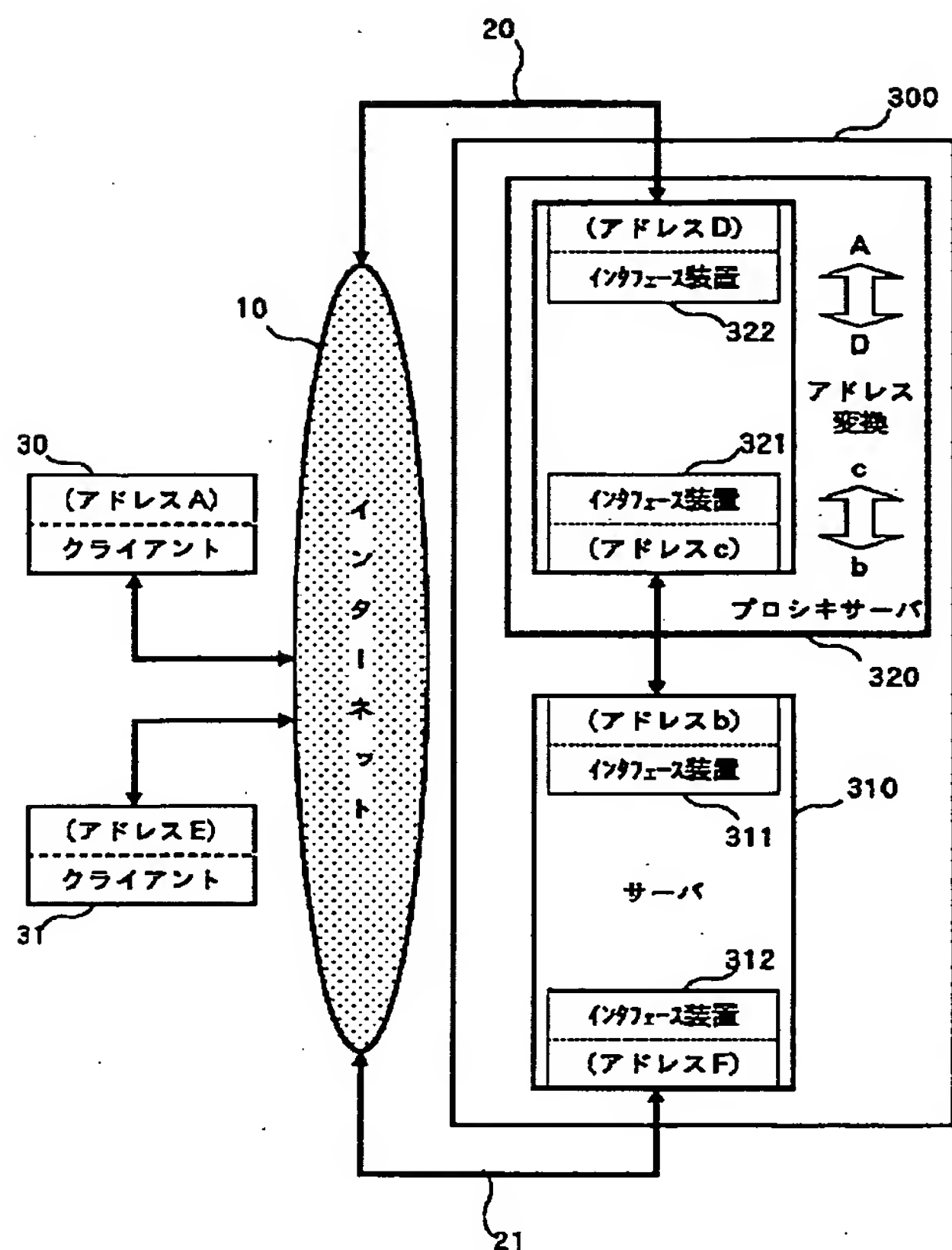【図４】（ａ）〜（ｃ）は、通信システムで送受信されるパケットの構成例を示した説明図。

【図５】ルーティングテーブルの構成例を示した説明図。

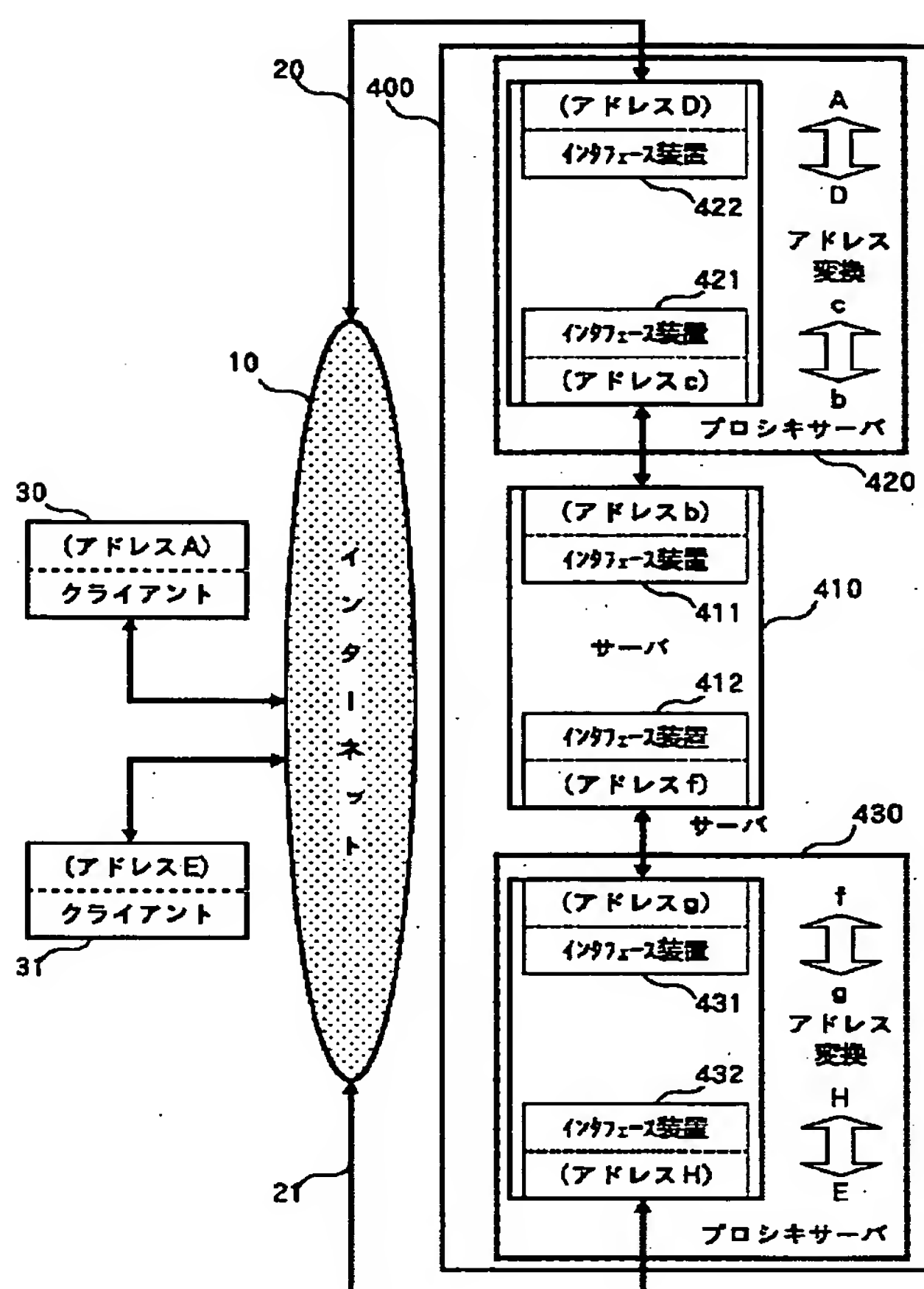【図６】２つのサーバを設けた従来の通信システムの構成図。

【図７】２つのインタフェース装置を備えた従来の通信システムの構成図。

【符号の説明】

１０	インターネット
２０、２１	通信路
３０、３１	クライアント
１００、１１０、２００、３００、４００	サイト
３２０、４２０、４３０	プロキシサーバ
１０１、１１１、２１０、３１０、４１０、５１０	サーバ
１０２、１１２、２１１、２１２、３２１、３２２、３１１、３１２、４１１、４１２、４２１、４２２、４３１、４３２、５１１、５１２	インタフェース装置
５１３	プロトコル判別部
５１４	パケット長判別部
５１５	優先度判別部
５１６	データビット判別部

【図１】

【図２】

【図４】

(a)

＜パケットＡ＞

送信元アドレス (255.20.34.12)	送信先アドレス (155.19.25.37)	プロトコル (HTTP)	優先度 (高)	データ

(b)

＜パケットＢ＞

送信元アドレス (255.20.34.13)	送信先アドレス (175.20.35.10)	プロトコル (FTP)	優先度 (低)	データ

(c)

＜パケットＣ＞

送信元アドレス (255.20.34.12)	送信先アドレス (185.45.67.21)	プロトコル (HTTP)	優先度 (高)	データ

【図５】

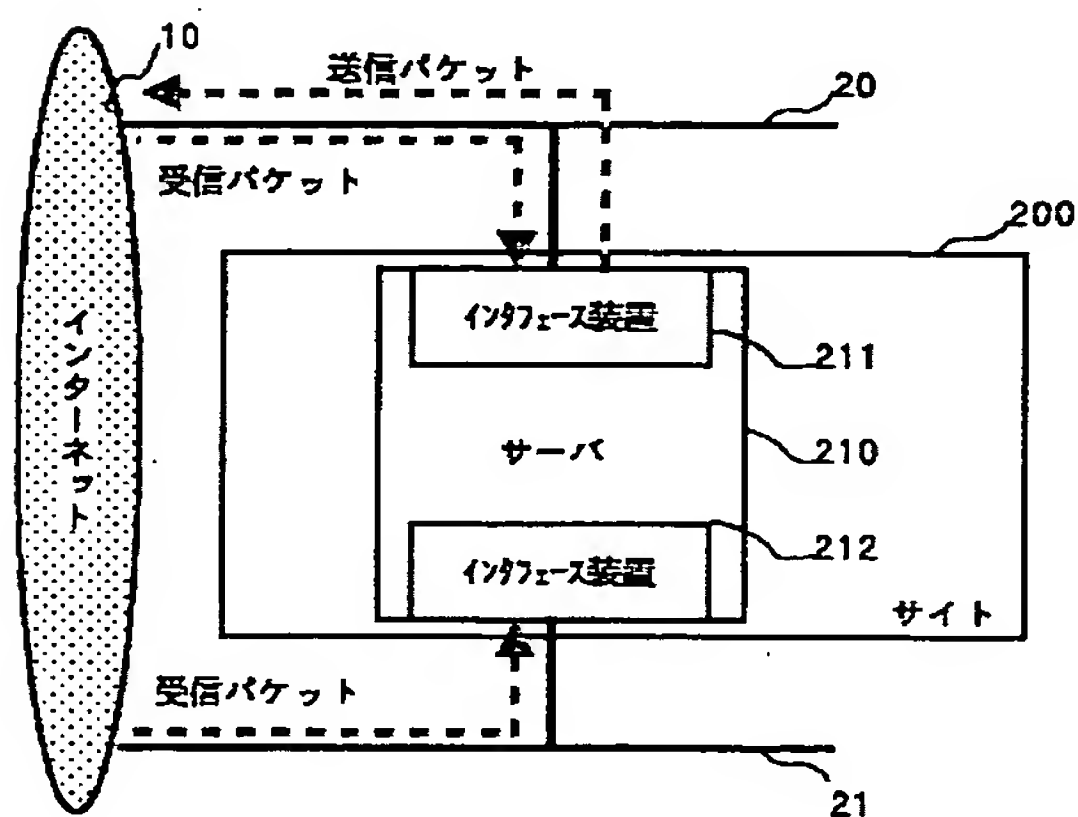| 送信元アドレス	送信先アドレス	プロトコル	優先度	出力インタフェース装置
255.20.34.12	155.19.25.37	HTTP	高	511
255.20.34.13	175.20.35.10	FTP	低	512
255.20.34.12	185.45.67.21	HTTP	高	511

【図３】
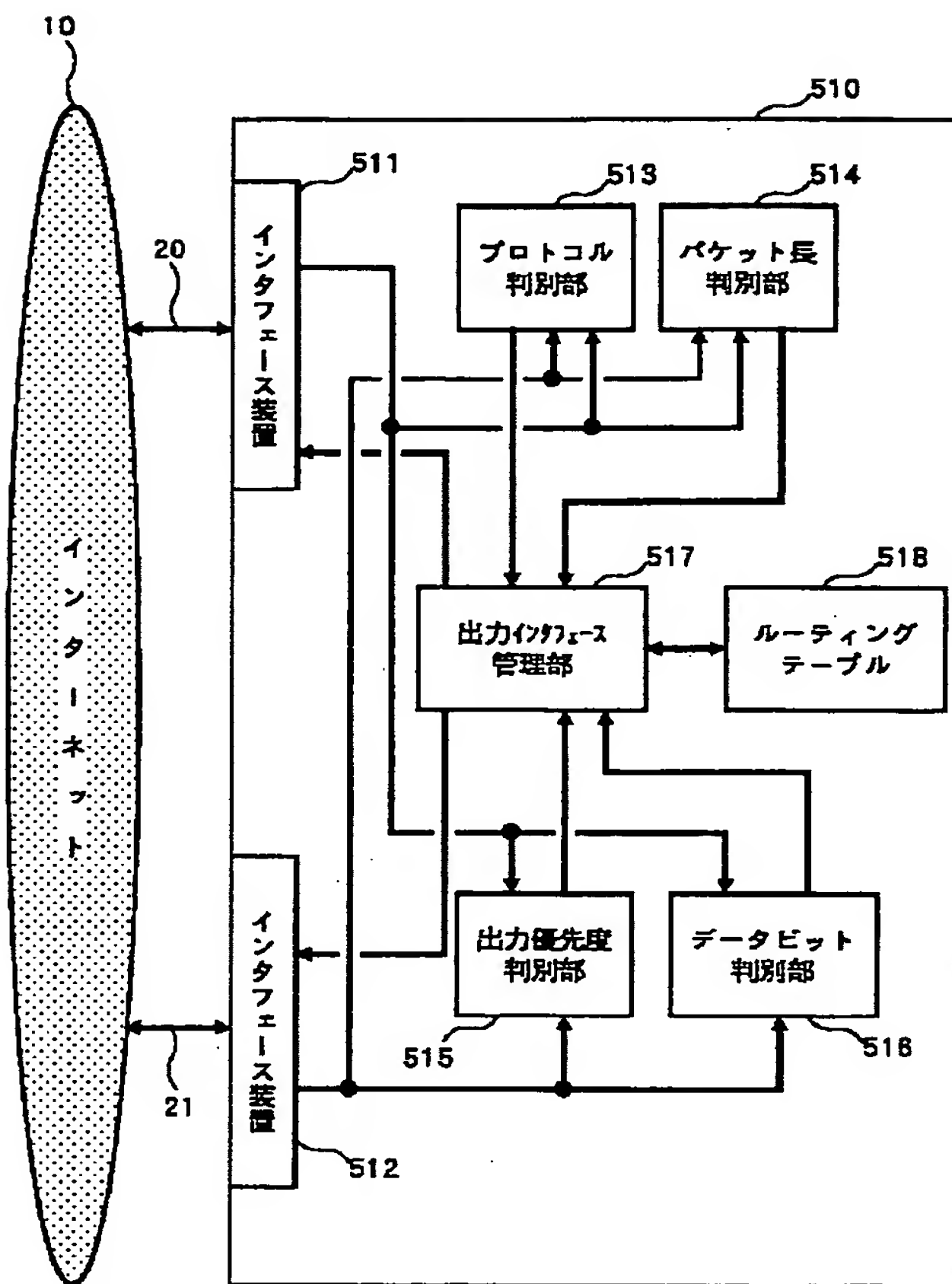
【図６】
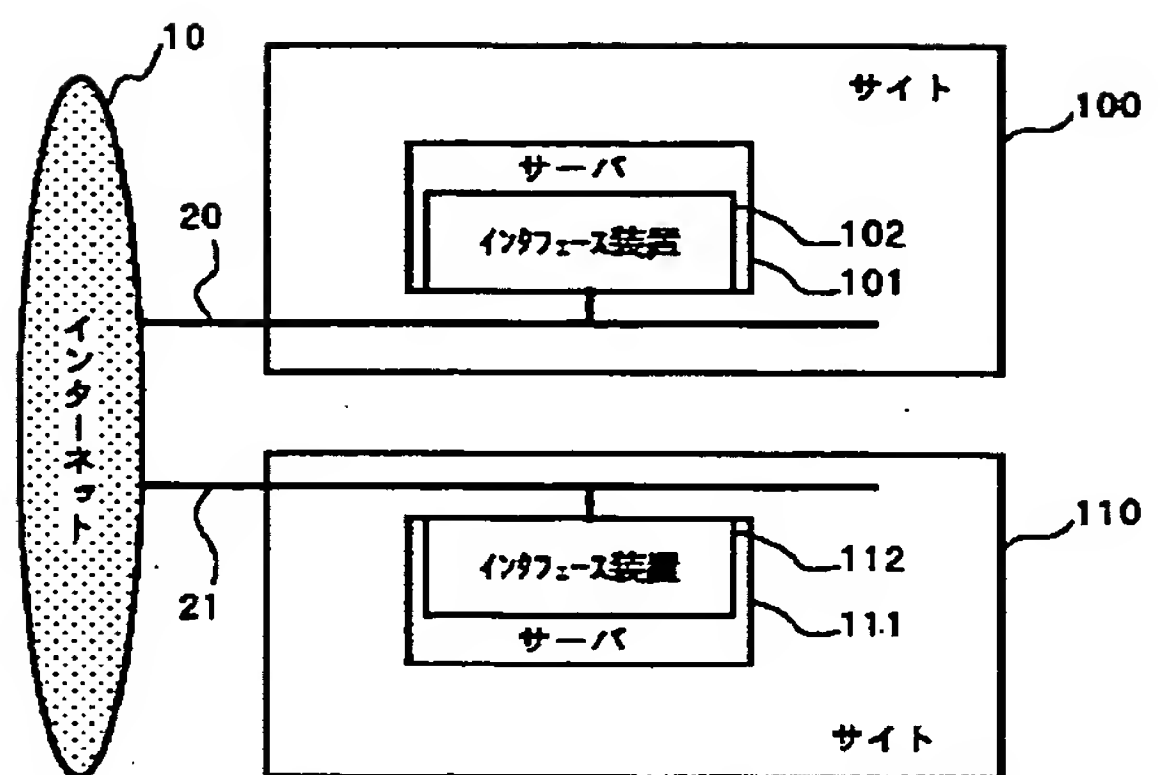
【図７】

フロントページの続き

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Ｆターム（参考）　5B089　GA19　GA21　HA10　KA07　KC39
　　　　　　　　　　　　KG05　KG08　KH03　MA03
　　　　　　　5K030　GA03　GA13　HA08　HC01　JT02
　　　　　　　　　　　　KA01　KA07　KA13　LB05　LD11
　　　　　　　　　　　　LE01　LE05